eny is a condensed phylogeny. . . . The mind as it is to-day, like the body as it is to-day, can only be adequately understood in the light of its developmental history throughout the ages of the past. . . . The fields of comparative theology and comparative mythology, of folklore and fairy tales, are rich in material of very practical significance in our present-day problems. . . . Mental disease in its destructive results brings the individual back to primitive and archaic methods of reaction,—reactions which may be better understood when we have studied the mind of primitive man and seen there what they mean." It is certainly satisfactory to psychologists and anthropologists to find their subjects thus enlisting the interest and cooperation of a large body of physicians, and the only apprehension is that the psychoanalytic method, applied in the armchair to the records of primitive man, may appear to the working anthropologist as somewhat lacking in directness and thoroughness.

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The Venom of Heloderma. By LEO LOEB.

Few portions of the world where reptiles occur at all are without some species of serpent venomous enough to be dangerous to human beings. The nature and mode of action of the poison of various serpents has, therefore, been of much practical interest and has attracted the serious attention of investigators in many lands. Nearly all lizards, on the contrary, are harmless. Indeed, the only species known to be venomous are the two kinds of Gila monsters found in Mexico and on our own southwestern deserts of New Mexico, Arizona and Nevada. Perhaps because of its more purely scientific interest, the venom of these lizards has received comparatively little study. The only careful investigations have been by Mitchell and Reichert, Santesson, Van Denburgh and Wight. While these authors have agreed as to the deadly nature of the venom of these lizards they have differed in many points as regards its mode of action.

In a paper of some two hundred and forty-four pages issued by the Carnegie Institution of Washington[1] one finds a series of articles in which are set forth the results of investigations of the poison glands and venom of the poisonous lizards of the genus *Heloderma.* These articles are by Leo Loeb and a large number of collaborators who made use of the Laboratory of Experimental Pathology of the University of Pennsylvania.

The anatomy and histology of the poison glands are described and it is stated that *Heloderma horridum* has the same anatomical arrangement as has been described in the case of *H. suspectum.* It is shown that pilocarpine increases the flow of venom and that transplanted portions of the gland retain their toxic character. Venom was not found in the blood or organs of *Heloderma,* except in the poison glands. It would thus appear that the venom is formed in these glands, not selected and excreted by them, and that there is no internal secretion of venom.

Gila monster venom affects mainly the central nervous system, and death is mainly due to paralysis of the respiratory center. There is a marked primary fall in blood-pressure of vasomotor origin. Diminution in the flow of urine is merely the result of the decrease in blood-pressure. Structural changes in the tissues of the poisoned animal are very slight, but extravasations of blood sometimes occur.

Gila monster venom is stated to cause hemolysis only in the presence of some activator such as lecithin and certain blood sera. It has no cytolytic power except upon the erythrocytes.

Heloderma is immune to its own venom. That is not due to the presence of antitoxin in its circulation.

Dr. Alsberg "succeeded in obtaining the *Heloderma* venom in a state in which it no longer gave the biuret reaction, thus proving

[1] "The Venom of *Heloderma,*" by Leo Loeb, with the collaboration of Carl L. Alsberg, Elizabeth Cook, Ellen P. Corson White, Moyer S. Fleisher, Henry Fox, T. S. Githens, Samuel Leopold, M. K. Meyers, M. E. Rehfuss, D. Rivas and Lucius Tuttle, Washington, D. C., May 10, 1913.

that its poisonous principle is a substance free from proteid or only secondarily combined with it."

No local effects were observed at the point of injection of Gila monster venom, and no curare-like action was noted. No marked changes in the clotting time of the blood of animals under the influence of *Heloderma* poison were found.

These studies confirm, in the main, the investigations of Van Denburgh and Wight. Perhaps the principal difference in the two series of observations is regarding changes in the clotting time of the blood. The present investigators report no observed change in clotting time, while Van Denburgh, in pigeons subjected to *Heloderma* venom, found the blood firmly clotted in the auricles while the heart was still beating, and Van Denburgh and Wight observed that a primary shortening in the clotting-time was often followed by a complete loss of coagulability.

The results set forth in this volume by Leo Loeb and his collaborators constitute a valuable addition to our knowledge of reptile poisons. One can not but feel, however, that these results would be more readily available if given in much less extended form, nor need one be an emotionalist to doubt whether these results justify the experimental injection of venom into "more than 360 warm-blooded animals" in addition to many cold-blooded ones.

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SPECIAL ARTICLES

ANATOMY AS A MEANS OF DIAGNOSIS OF SPONTANEOUS PLANT HYBRIDS

In the genetical studies, which have assumed so large and justly prominent a position in biological work during the past few years, external characters have been investigated almost exclusively. It has in fact been quite generally assumed that plants which resemble one another externally either belong to the same species or are at best only varieties of the same species. Nevertheless it is true that the geneticist has often found it necessary, in his work, to secure by continued cultivation, "pure lines" of the plants he uses in his breeding investigations.

The intention of the present communication is to indicate that spontaneous hybrids are of extremely common occurrence either identical in appearance with recognized species or varying so slightly and constantly over wide areas from the norm, that they are recognized as merely varietal modifications of recognized species. They can often nevertheless be clearly diagnosed as hybrids by the investigation of their internal anatomy both vegetative and reproductive. The full data of these observations, accompanied by the necessary illustrations, will be published elsewhere.

It will be convenient to consider first the case of identical external structure covering profound differences in internal organization. In the course of anatomical experimental investigations, carried on in the laboratories of plant morphology of Harvard University, on some of the lower amentaceous Dicotyledons, specially directed towards the elucidation of the hitherto unrecognized but highly important relation of wood rays to genetical and phylogenetic sequence, material of *Betula pumila,* from the Arnold Arboretum of Harvard University, diagnosed as such both by the Arnold Arboretum and the Gray Herbarium, showed profound differences in organization from wild material of the same species, secured from widely separated localities in the eastern United States and Canada. Vegetatively the Arnold Arboretum specimens presented striking aggregations of wood rays in segments of the woody cylinder, such as are characteristic of the more primitive birches and alders, and in this respect presented a marked contrast to normal *B. pumila,* where rays of this type can not be said to occur. These peculiarities suggested its hybrid origin and the reproductive structures of the abnormal material were investigated for evidence for or against this hypothesis. Male cones examined early in March showed in the sporogenous regions of the anthers large areas of abortive spore-mother cells. Late in April it